Amendments to the Specification

The paragraph starting at page 6, line 8 and ending at line 23 has been amended as follows.

When such multipass printing is carried out, image data is divided into two pieces for the first and second scans in accordance with a predetermined arrangement, i.e., a mask so that these pieces are ~~supplementary~~ complementary to each other. In the most common case, in this image data arrangement, i.e., a decimation pattern (thinning out pattern), each pixel for the first scan alternates with the corresponding pixel for the second scan in both vertical and horizontal directions. In a unit print area (in this case, composed of four pixels), the entire image is printed by the first scan for forming every other dot and the second scan for using a pattern opposite to that for the first scan to form dots. Further, the distance a print medium moves during each scan, i.e., the amount of sub-scan, is set at a specified value. In Figs. 12 and 13, the print medium is moved a distance equal to four nozzles during each scan.

The paragraph starting at page 10, line 24 and ending at page 11, line 12 has been amended as follows.

For example, if the print head is adapted to eject ink on the basis of a ~~bubble jet (R)~~ BUBBLE JET ® method, thermal energy from a heater 1401 is used to generate bubbles in ink so that pressure generated by the bubbles causes the ejection of a

predetermined amount of ink droplet present close to an ejection opening 1402. However, liquid-liquid separation, i.e., the separation of the ink droplet from the nozzle, is unstable. Accordingly, after a main droplet 1403, an ink droplet called a "satellite" 1404 is ejected. The satellite 1404 is formed by separating the trailing end of the ejected droplet from its remaining part. The satellite 1404 has a smaller volume and a lower ejection velocity than the main droplet 1403. Further, the satellite 1404 is generated whether the ~~bubble jet (R)~~ BUBBLE JET ® method or a piezoelectric method or the like is used as an ink ejecting method.

The paragraph starting at page 12, line 3 and ending at line 23 has been amended as follows.

However, as described above, as the size of ink droplets and thus the size of the main droplet decrease, it becomes impossible to neglect the adverse effect of the satellite. That is, the volume of the satellite relates closely to ejection characteristics determined by the shape of the nozzles or the like. Thus, it does not decrease consistently with the size of the main droplet. Accordingly, as the size of the main droplet dot decreases, the difference in size between the satellite dot and the main droplet dot ~~tents~~ tends to decrease. Specifically, the leading end of the ejected droplet becomes the main droplet, whereas the separated trailing end becomes the satellite dot. Thus, the characteristics of the ejection port or ink, specifically viscosity and surface tension, affect the size of the satellite dot. Accordingly, even if the size of the main dot is reduced, the

size of the satellite dot does not decrease in proportion to the reduction in the size of the main droplet. As a result, a decrease in the size of droplets relatively enhances the adverse effect of the satellite dot. Therefore, it is important that an image forming technique takes even the satellite into consideration.

The paragraph starting at page 13, line 11 and ending at line 16 has been amended as follows.

If one-pass printing, i.e., non-multipass printing, is carried out, a forward scan and a backward scan are switched at intervals of 304-nozzle widths (about 13 mm). Accordingly, the results of printing are such that the positions of the satellite dots are reversed at intervals of about a 13-mm width.

The paragraph starting at page 13, line 17 and ending at page 14, line 8 has been amended as follows.

Fig. 17C shows the line density of printed ruled lines. For example, when the main droplet ejection velocity V = 15 m/s, the satellite ejection speed = 10 m/s, the paper distance D = 1.6 mm, and the scanning velocity Vp = 25 inch/s, the length of misalignment L is 0.03 mm. Since human sense of sight is characterized by having a low resolution, the ruled lines are substantially perceived as the line density schematically represented in Fig. 17D. Between a forward scan and a backward scan, the line density is

reversed as shown in Fig. 17E. The line density during the forward scan does not substantially overlap the line density during the backward scan. Accordingly, the results of printing are such that parts of a ruled line each corresponding to the nozzle width are connected together irregularly. To join together smoothly parts of the ~~rule~~ ruled line printed during ~~a~~ forward and backward scans, respectively, the print head must be registered as shown in Fig. 18A to maximize the overlapping of the line densities of forward and backward scan dots.

The paragraph starting at page 18, line 10 and ending at line 25 has been amended as follows.

Figs. 24A and 24B are schematic ~~view~~ views showing an arrangement of dots on a sheet in order to describe a phenomenon in which when a checker-pattern-like mask is used for two-pass printing, the impact position varies during bidirectional printing because of different drive modes. Figure 24A shows a drive mode in which the delay time d for the drive timing is set at 3.5 μsec in order to reduce the dot shifting width w to 1,200 dpi (1/1,200 inch) (this mode is called a "1,200-dpi drive mode"). This figure shows, in its left, the positions of dots obtained during the first and second scan ejections, and in its right, the arrangement of the dots on a sheet after printing. The scanning direction is reversed between the first scan and the second scan. Accordingly, before the second scan, ~~i.e.~~ i.e., before backward printing, the ejection order within each block is reversed.

The paragraph starting at page 27, line 9 and ending at line 10 has been amended as follows.

Fig. 17E is a chart showing the line density observed during ~~a~~ forward and backward scans;

The paragraph starting at page 27, line 16 and ending at line 17 has been amended as follows.

Fig. 18B is a chart showing the line density observed during ~~a~~ forward and backward scans;

The paragraph starting at page 32, line 12 and ending at line 24 has been amended as follows.

Description will be given of ink ejection by taking the black ink by way of example. The ink has been filled up to the vicinity of the ejection opening 5004. To eject the ink, an electric signal is transmitted to the ejection heater 5003. The ejection heater 5003 generates heat for a predetermined time to generate instantaneously bubbles in ink present close to the heater. Then, pressure generated by the bubbles causes a predetermined amount of ink to be ejected from the ejection opening 5004 as a droplet. In the present embodiment, such a ~~bubble jet (R)~~ BUBBLE JET ® method is used to eject the

ink. However, the present invention is not limited to this aspect. A piezoelectric method may also be used.

The paragraph starting at page 39, line 24 and ending at line 27 has been amended as follows.

The CPU determines the printing method on the basis of the print mode and the type of print media inputted by the user. The determination is made in accordance with the table ~~shown~~ described below.

The paragraph starting at page 45, line 4 and ending at line 14 has been amended as follows.

In the present embodiment, the bidirectional registration patches of the registration pattern are subjected to multipass printing for registration. For multipass printing, the registration values are used as they are, whereas for non-multipass printing, they are corrected. However, the method described below is also possible. The bidirectional registration patches of the registration pattern ~~is~~ are subjected to non-multipass printing. For multipass printing, the registration values are corrected, whereas for non-multipass printing, they are used as they are.

The paragraph starting at page 46, line 10 and ending at line 23 has been amended as follows.

In Example 1, description has been given of registration value fine-tuning adapted to prevent the nonuniformity of the density caused by the misaligned impact positions of satellite dots associated with the characteristics of a particular printing method. However, images may be degraded not only by satellite dots but also by a small variation in the impact position of each dot between a forward scan and a backward scan. This is because the registration values set in accordance with the drive mode for a predetermined print head do not match another drive mode. Thus, in the present example, description will be given of a printing operation of ~~fin-tuning~~ fine-tuning the registration values in accordance with the drive mode for the print head.

The paragraph starting at page 47, line 2 and ending at line 15 has been amended as follows.

The ink jet printing apparatus according to the present embodiment is provided with the three print modes in order to achieve the respective grades of print images as desired by users. The user can select the "beautiful" mode if he or she desires a high-quality image in spite of a long time required for printing. The user can select the "fast" mode if he or she desires a reduction in the time required for printing in spite of the slight degradation of images. The user can select the "standard" mode if he or she desires a

standard image quality and a standard printing velocity. The user may perform this selecting operation on the host computer or by using the operation buttons provided on the ink jet printing apparatus main body.

The paragraph starting at page 52, line 10 and ending at line 15 has been amended as follows.

In Example 2, multipass printing is carried out in all the print modes. However, the present invention is not limited to this aspect. It is possible to use a mixture of multipass printing and non-multipass ~~printing may be used~~ printing. It is also possible to use a combination with the registration fine-tuning in Example 1.

The paragraph starting at page 52, line 16 and ending at page 53, line 2 has been amended as follows.

As described above, the drive timing adjustment value determining step uses different adjustment values for a case in which the movement pitch during the paper feeding operation is smaller than the arrangement pitch of the nozzles in the print head and for other cases. Consequently, in the bidirectional printing, an image is printed at an appropriate position whether or not the movement pitch during the paper feeding operation is smaller than the arrangement pitch of the nozzles in the print head. Therefore, in an ink jet printing apparatus having a plurality of print modes including the bidirectional print

mode, multipass print mode, and non-multipass print mode, images can be appropriately printed without degradation ~~the~~ in all the modes.